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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/064,829	08/21/2002	Chellappa Balan	124719	9788
41838	7590	02/23/2006	EXAMINER	
GENERAL ELECTRIC COMPANY (PCPI) C/O FLETCHER YODER P. O. BOX 692289 HOUSTON, TX 77269-2289			DOVE, TRACY MAE	
			ART UNIT	PAPER NUMBER
			1745	

DATE MAILED: 02/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/064,829

Applicant(s)

BALAN, CHELLAPPA

Examiner

Tracy Dove

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 August 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

This Office Action is in response to the communication filed on 7/14/05. Applicant's arguments have been considered, but are moot in view of the new grounds of rejection. Claims 1-14 are pending.

#### ***Response to Amendment***

Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn. The amendment filed 7/14/05 has been entered.

#### ***Drawings***

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: "90" in Figure 1. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to under 37 CFR 1.83(a) because they fail to show reference numerals "240" and "250" as described in the specification. Any structural detail that is essential

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for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

The specification is objected to because reference character “180” has been used to designate both a cavity and an anode. The drawings show reference character “220”, not “180”, is the anode.

### ***Claims Analysis***

The limitation “disposed to allow a flow of a fluid therethrough so as to enhance the heat transfer between said fluid and said fuel cell components” in claim 1 is not given patentable weight because the claim is directed toward an apparatus. Similarly, in claim 3 “so as to cause

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hydrodynamic interactions and affect the heat transfer rate between said fluid and said concavities when said fluid is disposed over said concavities” is not given patentable weight because the limitation does not limit the claimed “apparatus”. Note these limitation are also contained in claims 7 and 10, respectively. The limitation regarding heat transfer and hydrodynamic interactions in claim 12 is not given patentable weight.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 7 recite “enhance the heat transfer between said fluid and said fuel cell components”, which is indefinite because the term “enhance” is indefinite. Furthermore, the phrase “the heat transfer rate” lacks antecedent basis in the claims.

Claims 3 and 10 recite “affect the heat transfer rate”, which is indefinite because it is unclear how the concavities on a surface portion of each of the upper channel and lower channel affect the heat transfer rate *between said fluid and said concavities*.

Claim 7 recites “fuel cell electrode and an electrolyte disposed therebetween”, which is indefinite. While an electrolyte may be disposed between a pair of fuel cell electrodes, the electrolyte cannot be disposed between a single fuel cell electrode.

Claim 7 recites the limitation “at least one of said electrodes”. There is insufficient antecedent basis for this limitation in the claim.

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Claim 9 should recite "said fuel cell electrode is selected from the group consisting of a cathode and an anode".

Claim 12 recites "affect the heat transfer rate", which is indefinite because it is unclear how the concavities on a surface portion of the fuel cell electrode affect the heat transfer rate between said fluid and said fuel cell electrode.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 5-9, 13 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Wozniczka et al., US 6,232,008.

Wozniczka teaches a fuel cell stack including a pair of separator plates (base plates) interposed between adjacent membrane electrode assemblies. Passageways fluidly interconnecting the anodes to a fuel manifold, and interconnecting the cathodes to an oxidant manifold, comprise at least one fluid passageway formed between adjoining non-active surfaces of the pairs of separator plates. The passageways extend through one or more ports (cavity) penetrating the thickness of one of the plates thereby fluidly connecting the manifold to the opposite active surface of that plate, and the adjacent electrode (abstract). The non-active surfaces of adjoining separator plates in the fuel cell stack can cooperate to provide passageways

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for directing at least one of the reactant from a respective fuel or oxidant manifold to the appropriate electrodes. In cases where the non-active surfaces of two adjoining separator plates accommodate both the oxidant and fuel reactant streams, the fuel and oxidant reactant streams are, of course, fluidly isolated from each other. Coolant passages may also be conveniently provided between the non-active surfaces of adjoining separator plates (3:63-4:5). See also column 4, line 59 through column 5, line 10. The fluid port is fluidly connected to a plurality of fluid channels formed in the active surface. The separator plates may be flow field plates wherein the active surfaces have reactant flow field channels formed therein (5:17-27). See Figure 5B that shows ribs and channels on both sides of the separator plate. Passages for a coolant may also be formed between co-operating non-active surfaces of adjoining anode and cathode plates, or one or more coolant channels may be formed in the active surface of at least one of the cathode and/or anode separator plates. In an operating fuel cell stack, a coolant may be actively directed through the cooling channels or passages (5:60-6:8). The separator plates may be metal (5:28-46). The fuel cell stack may be a solid polymer fuel cell stack (1:17-20).

Thus the claims are anticipated.

\*

Claims 1, 2, 5, 7-9 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Jones et al., US 5,998,054.

Jones teaches a polymer electrolyte fuel cell comprising an anode, a cathode and an electrolyte. Figure 4 shows a fuel cell fluid flow plate 120'' (base plate) comprising a first face 122 (upper section) and a second face 122'' (lower section) wherein the first face 122 comprises serpentine flow channels 124'' (upper channel) and the second face 122'' comprises channels

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140``(lower channel). The channels 124`` and 140`` are fluidly connected by an injection port 131`` (cavity) (7:44-50). The injection of water through the port affects the heat transfer between the reactant fluid in the flow plate channels 124`` and a fuel cell component (4:55-61). The fluid flow plate 120 may be a bipolar, monopolar, anode cooler or cathode cooler plate. Face 122 is an anode side or cathode side of the fluid flow plate. The flow channels carry an appropriate reactant fluid such as hydrogen or air/oxygen (5:33-45). See column 6, lines 50-65. Where the fluid flow plate 120 is a bipolar plate, an opposite face 122' (not shown) similarly can have a metering area 130' positioned approximately at inlets 126' of flow channels 124', as will be understood by those skilled in the art. For instance, a repetition of the machining pattern depicted on Fig. 2 on the opposite face of that same fluid flow plate desirably would provide a metering area at a consecutive corner of the plate, which would allow convenient connection to another fluid manifold for supply of an appropriate reactant fluid (7:5-15). Additionally, working section 114 could easily include fuel cells other than PEM-type fuel cells (8:28-29).

Thus the claims are anticipated.

\*

Claims 1, 2, 5-9, 13 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Issacci et al., US 6,686,084.

Issacci teaches a gas block mechanism for water removal in fuel cells. The fuel cell comprises a cathode, an anode, an electrolyte and a cathode plate assembly for use with a cathode gas in the polyelectrolyte membrane fuel cell. The cathode plate 12 has a first inside surface 14 and a second opposite outside surface 16 wherein the first inside surface 14 is a flow field 22 comprised of feed side interdigitated channels and exhaust side interdigitated channels



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that are in an interdigitated configuration (2:51-61). On the outside surface 16 there may be a cooling channel 18. Inserted into the surface of the cathode plate 12 and adjacent to the flow field 22 are porous gas block mediums 24. A gas diffusion layer 26 (cathode) may be positioned over the inside surface 14 of the cathode plate. The cathode plate may be made of conducting plastics or a metal with a corrosion-resistant coating (5:35-51). The cooling channel 18 is positioned to be in fluid communication with the porous block medium 24. The outside surface 16 may include an anode flow field, or a coolant flow field (5:61-6:3). The coolant may be any liquid that has a heat transfer capability without boiling at the operation of the fuel cell. Water is a suitable coolant. If the gas block is in fluid communication with the coolant, the coolant is preferably water (6:14-26). The porous gas block medium 24 may function such that water is sipped off to the outside of the plate by capillary flow, and cathode gas is blocked from flowing to the outside of the plate. The water may be sipped off to cooling channels 18 on the opposite side of the cathode plate 12 (9:46-52). An advantage of Issacci is that there is no need for a coolant plate for each cell where the cooling rate allows for one coolant plate for more than one cell (enhances heat transfer). The single water channels in a cell are manifolded to the coolant flow that also feeds the coolant plates in the stack (12:50-59).

Thus the claims are anticipated.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-14 have been considered but are moot in view of the new ground(s) of rejection.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



TRACY DOVE  
PRIMARY EXAMINER

February 17, 2006